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RESEARCH ARTICLE

The Human Bio-Energy Field Detected by a Torsion Pendulum? The Effect of Shielding and a Possible Conventional Explanation

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Abstract—J. N. Hansen and J. A. Lieberman at the University of Maryland have published accounts of their use of a simple and inexpensive torsion pendulum to detect and measure a time-varying force exerted by the human head. In view of control experiments intended to rule out conventional explanations in the form of electrostatic or convective forces, they suggest that this force may be due to a "field of bio-energy . . . [that] is the basis of many forms of traditional medicine that have been practiced for thousands of years" but which has heretofore been undetectable by science. We have replicated their basic results using similar equipment (Hansen 2013 personal communication), furthermore ruling out magnetic forces and using a different means of ruling out electrostatics. However, it was found that the use of a specially constructed plastic shield to more rigorously rule out convection from the warm human head entirely eliminates the external torque on the pendulum. It therefore appears that either the origin of the force is convective, or else the material of which the shield is made blocks the human bioenergy field.

Keywords: bioenergy field—torsion pendulum—convection

Introduction

One may define the bio-energy field as that which mediates effects such as distant healing or psychokinesis. Efforts have been made to detect this field via the phenomena of light refraction and scattering, skin conductance, electrostatic potential, magnetism, brain activity (via electroencephalography or functional magnetic resonance imaging), effects on random event generators, and gamma radiation (Oschman 2000, Swanson 2011). All of these tend to require either sophisticated, expensive equipment or subjects with exceptional psychic ability, or both. Hansen and Lieberman

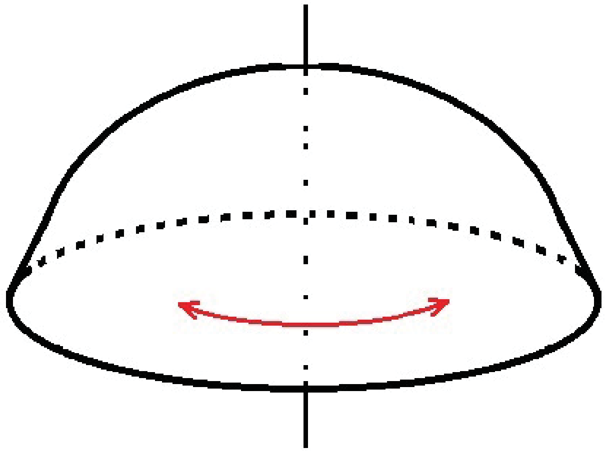

Figure 1. The only moving part in this experiment: a mesh dome food cover. The only mode of oscillation that does not damp out in a few seconds is rotation about a vertical axis. This mode has a period of about 29 seconds and decays with a half-time of roughly 70 seconds.

claim to have found a simple, inexpensive way to detect the bio-energy field of the average person. Thus their method could accelerate progress in understanding the putative bio-energy field, by enabling essentially anyone to investigate its properties. It was decided to begin such a program by building an apparatus similar to that of Hansen and Lieberman's.

Replicating Hansen and Lieberman's Results

The pendulum is a dome-shaped, steel mesh food cover of the kind used to keep insects off food at picnics (Figure 1 and Figure 2). Its diameter is ~35 cm, and its mass is ~150 grams. It is suspended from a fixed support by a ~1.9 cm length of 30-pound-test nylon fishing line. The pendulum has several modes of oscillation, but all of these quickly damp out except rotation about a vertical axis. The latter mode is damped simple harmonic motion (DSHM) which can be described by

$$x = Ae^{-\gamma t} \cos(\omega t + \delta) \qquad (1)$$

where x is the horizontal position of a target on the rim of the dome. Its period, $T = 2\pi/\omega$, is ~29 seconds, and the damping constant γ is about 0.01 sec^{-1} (Figure 3).

In order to record the oscillation, a paper target consisting of a 1-cm white circle on a black background is attached to the rim of the dome (at a radius of 16.5 cm). A gentle, tangential puff of air starts the pendulum

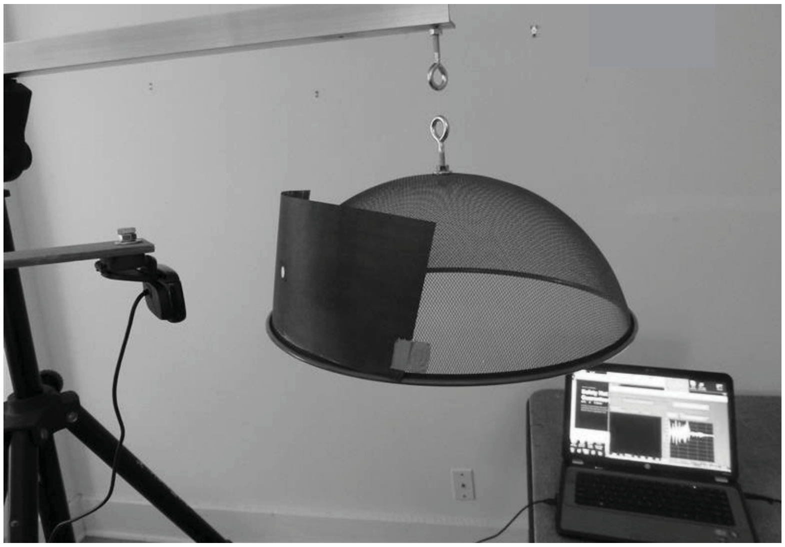

Figure 2. The experimental setup. From left to right, the webcam, the white target dot, the dome pendulum, and the computer running the LabVIEW software.

oscillating rotationally with an amplitude of a few degrees. A videocamera (webcam) ~10 cm away from the target records the motion of the target (see Figure 2). Following Hansen and Lieberman's procedure, the camera's

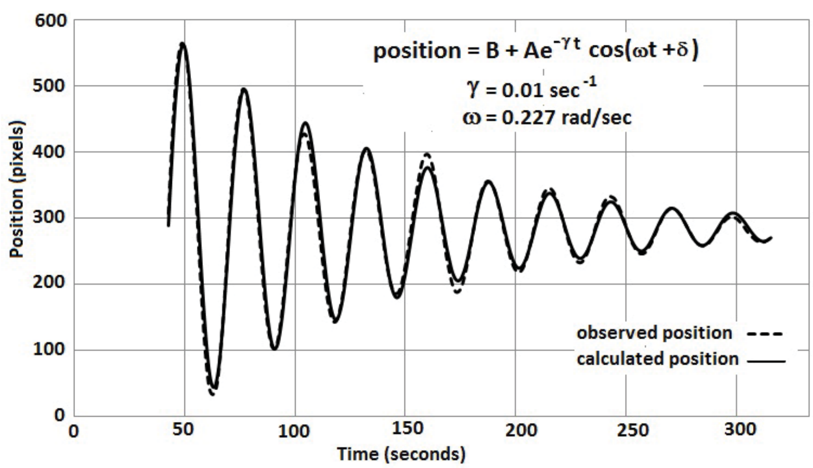

Figure 3. A comparison between calculated damped simple harmonic motion and observed oscillation of the pendulum in the absence of a human subject under the dome.

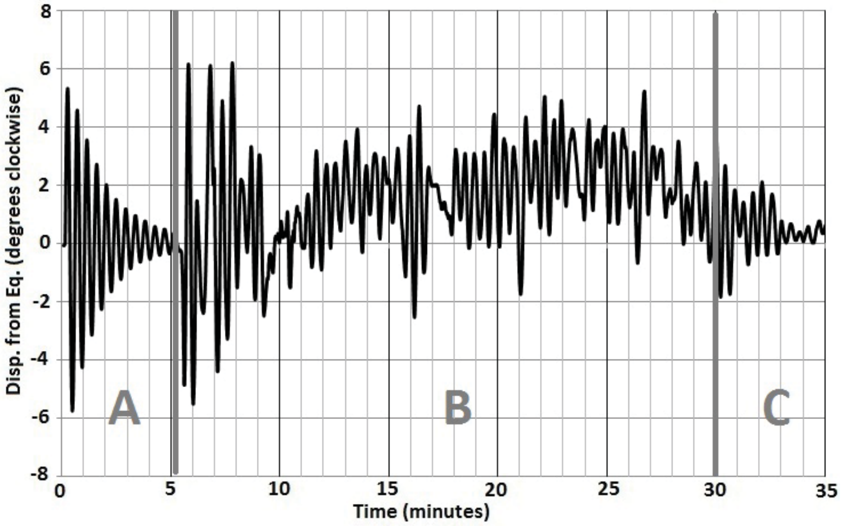

Figure 4. A typical run, from the Excel file of the webcam's output. In time segment A, the pendulum oscillated freely, with no one under it. In segment B, the subject sat still under the dome. At 30 minutes, the beginning of segment C, the subject exited the pendulum and left the room.

output is sent via USB cable to a laptop computer running a proprietary adaptation (He 2013) of LabVIEW software which records the horizontal position of the target and stores the data in an Excel file.

Figure 4 presents a typical result. First the pendulum was given a tangential impulse, causing it to execute DSHM, as shown in time segment A. After about 5 minutes a human subject sat down under the dome with the top of his head inside it, taking care not to touch it in any way or create any significant air currents. Then the subject sat still under the dome (segment B) until 30 minutes had elapsed. At the latter time, with similar care, the subject slid out from under the dome, and went into another room for the remainder of the run (segment C).

Sitting under the dome causes the oscillations to become erratic and usually shifts the equilibrium position by an angle of several degrees. The other modes of oscillation don't appear to be affected.

This effect appears to be common to all people. Hansen and Lieberman report similar results with more than a dozen subjects (Hansen & Lieberman 2013), and we have observed this phenomenon with six persons.

To rule out electrostatic forces, Hansen and Lieberman repeated the experiment using a copper wire instead of a nylon fiber to suspend the pendulum, and they grounded the pendulum and the subject during the

Figure 5. The experimental setup with the "Windshield," a cylinder of construction paper and foamboard. The pendulum is free to oscillate inside it.

experiment (Hansen & Lieberman 2013). As an alternative method of ruling out electrostatic forces, we used a piezoelectric pistol (Milty no date) to eliminate static charges. This did not alter the pendulum's strange behavior.

To rule out magnetic forces, the experiment was performed with an entirely non-ferromagnetic, non-conductive pendulum (a plastic tub) as well as with the steel mesh pendulum; the results are similar in both cases.

To rule out convection currents caused by the warmth of the human head, Hansen and Lieberman (2009, 2013) substituted a heated cooking pot for the human subject's head. We attempted to do the same, but found the results inconclusive and decided instead to construct a system that would more completely isolate the pendulum from wind and convection currents.

Results with Shielding

Because the pendulum is extremely sensitive to ambient air currents, the first component of the shielding system consists of a "Windshield," a cylinder of black construction paper suspended around the pendulum from above (Figure 5). When one's head is inserted under the pendulum when it is protected only by the Windshield, the results (Figure 6) are similar to what has already been presented.

The second stage of shielding the pendulum consists of a "Helmet" made of a plastic hemisphere into which the head fits snugly and which is surrounded by a layer of insulating foam and then a coaxial (essentially concentric) plastic food bowl (Figure 7). The Helmet protrudes through

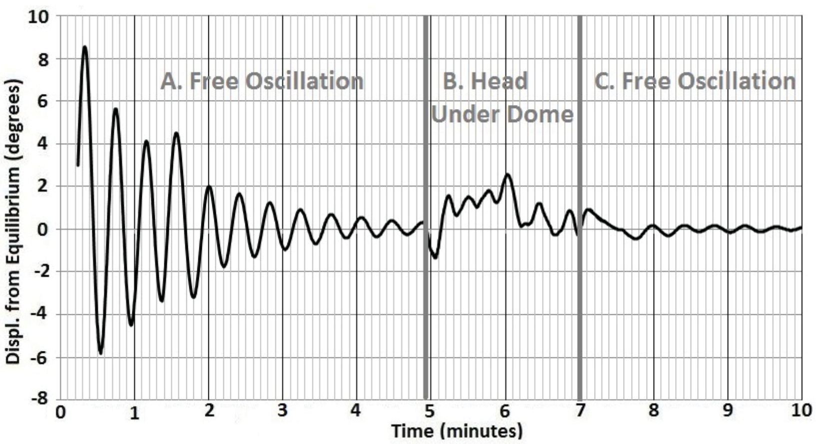

Figure 6. A typical run with the "Windshield" in place. The three time segments are as described for Figure 4. (The glitch at ~1.5 minute was most likely caused by the subject waving his arm too close to the apparatus.)

a sheet of plywood, up into the pendulum. The board through which the Helmet protrudes rests on legs made of PVC pipe; this is shown in Figure 8. Thus one's head can still be inside the pendulum dome but without exposing

Figure 7. Left: The "Helmet" under the suspended pendulum. Right: The "Helmet" seen from below. Construction of the "Helmet": Inner layer is a rigid plastic hemisphere with a 20.3 cm inside diameter, ~0.3 cm thick; Outer layer is a soft plastic food container with a 23.2 cm inside diameter at the rim. Between the two layers is a mixture of Dow Chemical "Great Stuff" insulating foam and DAP Products multi-purpose foam sealant.

Figure 8. The experimental setup with the "Windshield" and the "Helmet."

the pendulum to convection currents. Under these conditions, insertion of one's head up into the pendulum (Figure 8) had no noticeable effect on its DSHM (Figure 9).

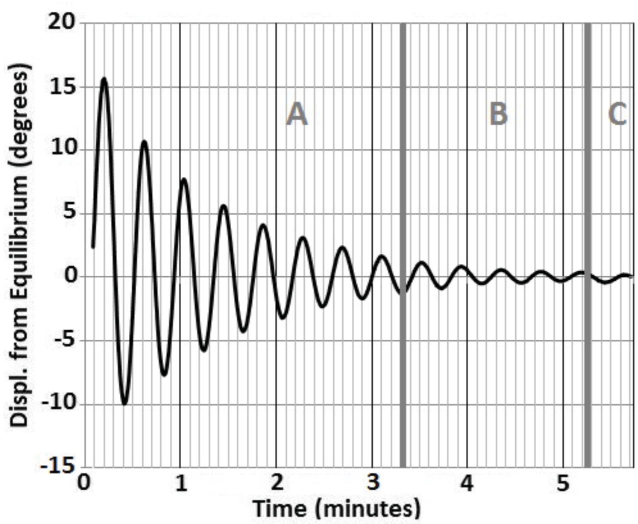

Figure 9. A typical run with both the "Windshield" and the "Helmet" in place. The three time segments are as described for Figure 4. Note that having the subject's head under the pendulum has no discernible effect.

Discussion

It appears that either 1) the "new cranial force" under investigation is merely due to convection currents from the head, or 2) the plastics of which the Helmet is made act as a shield against the "new cranial force."

It is useful to estimate the force or energy required to perturb the motion of the pendulum and compare it with what is available from natural convection around a human head. To estimate the tangential speed of the pendulum, we use the fact that, for simple harmonic motion, the maximum speed equals the amplitude times the angular velocity. Thus, from Figure 3, the speed of the pendulum's rim (when passing through equilibrium) is roughly (150 pixels)(0.014 cm/pixel)(0.23 rad/second) = 0.5 cm/second. Clark and Toy (1975) have measured the speed of convective air flow around a 33 °C human head in 23 °C ambient air to be in the 5–30 cm/second range, more than 10 times greater than the maximum speed of the pendulum.

Of course, convection currents are mostly vertical while what is needed to explain the pendulum's perturbation is a horizontal force. However, if the flow of air is turbulent there could easily be a horizontal component to this motion. Clark and Toy (1975) found significant differences in the rate of heat loss from different parts of the head: From the forehead they measured 130 W/m^2, but only 79 W/m^2 from the temple. This difference would surely cause a temperature gradient and hence some turbulence. In addition, the human head is not cylindrically symmetric, further increasing the likelihood of turbulence.

An additional consideration arguing against attributing the effects seen to a "human bioenergy field" is that, in general, effects such as psychokinesis, distant healing, and extrasensory perception are reportedly not affected by spatial or temporal separation, nor by intervening matter. [See for example Targ and Puthoff, (2004), Hasted (1981), Braud (2003), Schwartz (2007).] Furthermore, such "paranormal" abilities are anything but uniformly distributed among the population, but the ability to perturb a torsion pendulum appears universal.

In order to show that a torsion pendulum can actually detect a human bioenergy field, a material would have to be found that insulates the pendulum from convection currents and yet still allows oscillations to be perturbed in the way reported by Hansen and Lieberman.

Acknowledgments

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